REMARKS

Applicants amend the claims to remove multiple dependencies, to provide proper antecedent basis, and to address other matters of form. The foregoing amendments introduce no new matter and are not related to issues of patentability.

Entry of the foregoing Preliminary Amendment is respectfully in order and requested.

If there are any questions regarding the amendments to the application, we invite the Examiner to call Applicant's representative at the telephone number below.

Respectfully submitted,

LAHIVE & COCKFIELD, LLP

Anthony A. Laurentano
Registration No. 38,220
Attorney for Applicants

28 State Street
Boston, MA 02109
(617) 227-7400

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Version With Markings To Show Changes Made

Please amend claims 3, 5-10, 12-14, 16-20, 22, 23, 25, 27, 29, 32, 35, 37, 39, 40, 53, 62, 63, 65, 67, 69-71, 73, 75, 76 and 79 as follows:

3. A waveguide as claimed in ~~either~~ Claim 1 ~~or Claim 2~~, wherein the ion diffusion region surrounding the waveguide core forms a substantially rounded waveguide core.

5. A waveguide as claimed in ~~any one preceding~~ claim 1, further including a buffer layer formed on the substrate and wherein the lower cladding layer is formed on the buffer layer.

6. A waveguide as claimed in ~~any one preceding~~ claim 1, wherein the substrate comprises silicon and/or silica and/or sapphire.

7. A waveguide as claimed in Claim ~~6~~ 5, wherein said buffer layer includes a thermally oxidised layer of the substrate.

8. A waveguide as claimed in ~~any preceding~~ claim 5, wherein the buffer layer comprises doped silica.

9. A waveguide as claimed in ~~any preceding~~ claim 5, wherein the thickness of the buffer layer is in the range ~~0.2m~~ 0.2μm to ~~20m~~ 20μm.

10. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the lower cladding layer comprises doped silica.

12. A waveguide as claimed in Claim ~~11~~ 1, wherein the lower cladding layer includes at least one Phosphorus oxide and at least one Boron oxide and wherein the

Phosphorus oxide to Boron oxide ratio is such that the lower cladding layer refractive index is substantially equal to the refractive index of the buffer layer.

13. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the lower cladding layer includes doped silica, at least one Phosphorus oxide and at least one Boron oxide and wherein the silica:Phosphorus oxide:Boron oxide ratio is in the range of 75 to 95 wt% silica:1 to 7 wt% Phosphorus oxide:4 to 18 wt% Boron oxide.

16. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the thickness of the lower cladding layer is ~~1 m~~ 1μm to ~~20 m~~ 20μm.

17. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the waveguide core comprises doped silica.

18. A waveguide as claimed in ~~any preceding~~ claim 1, wherein said mobile dopant ions of the waveguide core include Phosphorus and/or Fluorine and/or compounds of these elements.

19. A waveguide as claimed in ~~any preceding~~ claim 1, wherein dopant ions of the waveguide core include Phosphorus and/or Fluorine and/or Aluminium and/or Boron and/or Germanium and/or Tin and/or Titanium and/or compounds of these elements.

20. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the waveguide core includes Phosphorus oxide and/or Boron oxide.

22. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the refractive index of the waveguide core differs from that of the lower cladding layer by at least 0.05%.

23. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the waveguide core includes silica, and at least one Phosphorus oxide and wherein the silica to Phosphorus oxide ratio is in the range of 75 to 95 wt% silica to 5 to 25 wt% Phosphorus oxide.

25. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the thickness of the waveguide core is in the range ~~2 m~~ 2µm to ~~60 m~~ 60µm.

27. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the lower cladding layer and the upper cladding layer refractive indices are substantially equal.

29. A waveguide as claimed in ~~any preceding~~ claim 1, wherein the waveguide core has a mobile ion dopant concentration higher than the mobile ion dopant concentration of the lower cladding layer or the upper cladding layer.

32. A method as claimed in ~~either~~ Claim 30 ~~or 31~~, wherein the diffusion of the said mobile dopant ions from the waveguide core swells the boundary walls of the waveguide core.

35. A method as claimed in ~~any one of~~ Claim~~s~~ 30 ~~to 34~~, and including the step of forming a buffer layer on the substrate.

37. A method as claimed in ~~any of~~ Claim~~s~~ 30 ~~to 36~~, wherein the steps of forming each of the lower cladding layer, the core layer and the upper cladding layer comprise the steps of:

depositing each layer; and

at least partially consolidating each layer.

39. A method as claimed in ~~any of~~ Claim~~s~~ 30 ~~to 38~~, wherein the diffusion of mobile ion dopants in the core layer occurs during the consolidation of the lower cladding layer and/or the upper cladding layer.

40. A method as claimed in ~~any of~~ Claim~~s~~ 30 further comprising at least one thermal processing step after the formation of the upper cladding layer, wherein during said thermal processing of the waveguide the mobile ion dopants in the core layer undergo diffusion into the surrounding layers.

53. A method as claimed ~~any of~~ Claim~~s~~ 30 ~~to 51~~, wherein said mobile dopant ions of the waveguide core include Phosphorus and/or Fluorine and/or compounds of these elements.

62. A method as claimed in ~~any of~~ Claim~~s~~ 35 ~~to 51~~, wherein said lower cladding layer and said buffer layer are formed substantially in the same step.

63. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 62~~, wherein the consolidation of the lower cladding layer is at a temperature or temperatures in the range 950°C to 1400°C.

65. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 64~~, wherein the consolidation of the core layer is at a temperature or temperatures in the range 950°C to 1400°C.

67. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 66~~, wherein the consolidation of the upper cladding layer is at a temperature or temperatures in the range 950°C to 1400°C.

69. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 68~~, wherein the temperature or temperature range at which the lower cladding layer is consolidated is greater than the temperature or temperature range at which the core is consolidated.

70. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 69~~, wherein the temperature or temperature range at which the upper cladding layer is consolidated is substantially equal to the temperature or temperature range at which the core layer is consolidated.

71. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 69~~, wherein at least one of the lower cladding layer, the core layer, and the upper cladding layer is deposited by a Flame Hydrolysis Deposition process and/or Chemical Vapour Deposition process.

73. A method as claimed in ~~any of~~ Claim~~s~~ 37 ~~to 72~~, wherein the consolidation is by fusing using a Flame Hydrolysis Deposition burner.

75. A method as claimed in ~~either of~~ Claim~~s~~ 73~~ or 74~~, wherein the step of fusing the lower cladding layer and the step of fusing the core layer are performed simultaneously.

76. A method as claimed in ~~any of~~ Claim~~s~~ 30~~ to 75~~, wherein the ion diffusion region is isotropic with respect to the waveguide core.

79. A method as claimed in ~~any of~~ Claim~~s~~ 30 ~~to 78~~ , wherein the waveguide core is formed from the core layer using a dry etching technique ~~and/or a photolithographic technique and/or a mechanical sawing process~~comprising a reactive ion etching process and/or a plasma etching process and/or an ion millng process.

Please cancel claims 11, 15, 24, 26, 28, 41-52, 54-61, 72, 74, 77, 78 and 80.